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*Flourishing second-year mesic prairie
restoration in the Sheyenne Delta of North
Dakota (July, 2004)*

Areas of Interest

My research interests in conservation biology emphasize topics that help to advance the mission of The Nature Conservancy: to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. <http://nature.org/wherewework/northamerica/states/minnesota/>

The Conservancy's adaptive management programs generate applied research opportunities that in turn can improve conservation land management at multiple scales. Particular areas of interest include:

- Developing vegetation management systems that are guided by natural disturbance processes
- Setting priorities and allocating resources for conservation in functional landscapes
- Ecologically compatible/economically viable land management
- Climate change implications for applied conservation efforts

Current Projects

Simulating the Effects of Climate Change and Disturbance on Forest Composition and Rates of Change in a Northeastern Minnesota Landscape Using a Spatially Dynamic Model. (In collaboration with Mark White, The Nature Conservancy of Minnesota; Robert Scheller and David Mladenoff, University of Wisconsin-Madison; Randy Swaty, The Nature Conservancy of Michigan; Patrick Gonzalez and Chris Zganjar, The Nature Conservancy's Global Climate Change Initiative <http://nature.org/initiatives/climatechange/>). TNC and partners in the northern lake states region have based conservation objectives on past climate and disturbance regimes. Projected rates of climate change may render objectives for future forest conditions obsolete. Conservation practitioners need new tools for setting priorities and

developing strategies in the context of a changing climate. We are addressing three key questions: 1) How will species composition in forest ecosystems shift under different climate change scenarios? 2) What are the viability implications of forest ecosystem targets undergoing compositional change? 3) How should conservation practitioners adapt strategies and actions to address climate-induced alterations in composition?

Applying landscape ecology principles in a multi-partner landscape: The Border Lakes Region of Minnesota and Ontario (In collaboration with Brian Palik, USFS North Central Research Station (NRCS) <http://www.ncrs.fs.fed.us/>). A TNC post-doctoral scientist will examine alternative outcomes for collaborative land management in this 5 million acre landscape of international significance using LANDIS and other ecological modeling tools.

Use of unevenaged management to restore structural complexity to North Shore northern hardwood forests of Minnesota. (In collaboration with Lee Frelich, The Center for Hardwood Ecology, University of Minnesota <http://www.cnr.umn.edu/FR/CFHE/index.html> and Eric Zenner, University of Minnesota Department of Forest Resources). We are designing and implementing gap-based silvicultural systems to treat degraded, second growth stands to improve timber quality and biodiversity value. The intent of this project is to develop ecologically compatible silvicultural practices that are also profitable, supporting the local economy. The first stage of the project is nearing completion, and we are exploring the possibility of continuing the work at additional sites in the Manitou Forest Landscape near Finland, Minnesota.

Effects of land management on native arthropod diversity in the Agassiz Beach Ridges of Minnesota. (In collaboration with David Rider and Jerry Fauske, North Dakota State University <http://www.ndsu.nodak.edu/ndsu/prairieinsects/>). Natural disturbance processes in the Northern Tallgrass Prairie Ecoregion included fire and grazing by native herbivores. Native tallgrass prairie has been largely fragmented, with <1% of the original extent remaining. The Nature Conservancy manages small preserves using methods intended to simulate historical disturbance processes. Techniques include prescribed fire, grazing (by cattle) and haying. Collaborators from NDSU are evaluating the impacts of our management practices on native arthropods under different management regimes in comparison with unmanaged prairie remnants using a ten year data set collected from three sites.

Effectiveness of biological controls for leafy spurge and implications for native plant diversity in tallgrass prairie. (In collaboration with Pete Bauman, The Nature Conservancy; David Breyfogle, Minnesota Department of Natural Resources; Cynthia Lane and Carolyn Carr, Ecological Strategies, LLC). We have examined the effectiveness of several biocontrol methods for leafy spurge at a number of sites throughout the Northern Tallgrass Prairie Ecoregion with an interest in the response of the target weed and the native plant community. Biocontrols examined include goats, sheep, and flea beetles at Altamont Prairie in South Dakota for ten years. Ongoing work related to flea beetles continues at Broken Kettle (Iowa), Crystal Springs (South Dakota) and Brown Ranch (North Dakota).

Selected Publications

Sarr D., K. Puettmann, R. Pabst, M. Cornett, and L. Arguello. 2004. Restoration ecology: new perspectives and opportunities for forestry. *Journal of Forestry* 102: 20-24.

Anderson C. E., K. A. Chapman, M. A. White, and M. W. Cornett. 2002. Effects of browsing control on establishment and recruitment of eastern white pine (*Pinus strobus* L.) at Cathedral Grove in the Lake Superior Highlands, Minnesota. *Natural Areas Journal* 22: 202-210.

Cornett, M. W., K. J. Puettmann, L. E. Frelich, and P. B. Reich. 2001. Comparing the importance of seedbed and canopy type in the restoration of upland *Thuja occidentalis* forests of northeastern Minnesota. *Restoration Ecology* 9(4):386-396.

Cornett, M. W., L. E. Frelich, K. J. Puettmann, and P. B. Reich. 2000. Conservation implications of browsing by *Odocoileus virginianus* in remnant upland *Thuja occidentalis* forests. *Biological Conservation* 93:359-369.

Cornett, M. W., P. B. Reich, K. J. Puettmann, and L. E. Frelich. 2000. Seedbed and moisture availability determine safe sites for *Thuja occidentalis* germination. *American Journal of Botany* 93:359-369.

Cornett, M. W., and C. Evenson. 1999. Direct seeding: A promising hardwood forest restoration strategy (Minnesota). *Ecological Restoration* 17(4):230-231.

Cornett, M. W., K. J. Puettmann, and P. B. Reich. 1998. Canopy type, leaf litter, predation, and competition influence seedling emergence and survival in two Minnesota conifer-deciduous forests. *Canadian Journal of Forest Research* 28:196-205.

Cornett, M. W., P. B. Reich, and K. J. Puettmann. 1997. Canopy feedbacks and microtopography regulate conifer seedling distribution in two Minnesota conifer-deciduous forests. *Écoscience* 4:353-364.